DETAILED ACTION

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 15-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants are requested to point out support in the instant specification, by page and line numbers, "from first and second directions to the opposite first and second surfaces".

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 15-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 15, it is unclear what is required by "from first and second directions to the opposite first and second surfaces" because it is unclear what are first and second directions and how the treating liquid can be supplied from "first and second *directions*" to the opposite "first and second *surfaces*".

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turschmid et al (6,013,512) in view of Eguchi et al (5,518,620) and Cruze (5,378,280).

Turschmid '512 discloses a process for the removal of gaseous pollutants from a waste gas stream. In one embodiment, the waste gas stream can contain volatile organic compounds which are removed from the waste gas stream by an aqueous suspension of microorganisms (note column 1, lines 9-22).

In Turschmid '512, Figure 7 is directed to using absorption tower 1 in combination with a liquid washing chamber generally 20. As shown, washing chamber 20 contains a scrubbing fluid such as water which is circulated by a pump 22 from the bottom of chamber 20 to the top of the chamber 20. At the top of chamber 20, the scrubbing fluid is dispensed into the chamber where it contacts a waste gas stream traveling upwards through the chamber as shown. The scrubbing fluid absorbs portions

of pollutants contained within the gas stream (note column 9, lines 49-58). The scrubbing fluid collected in chamber 20 can then be fed to absorption tower 1. For instance, in one embodiment, the scrubbing fluid can be fed continuously at a constant rate to the biomass chamber. Any pollutants contained within the scrubbing fluid can be degraded by microorganisms contained in the biomass suspension within biomass chamber 10 (note column 10, lines 6-12).

Turschmid '512 discloses that for the organic carbon (VOC) reaction, oxygen is required (note column 3, lines 10-12) and when treating volatile organic compounds, it may be necessary to feed to the biomass suspension an oxygen source and a nitrogen source, if such elements are not contained in the waste gas stream being treated (note column 8, lines 40-43).

The VOCs that may be treated in Turschmid '512 include alcohols, ketones, amines, etc. (note column 8, lines 26-36).

The bacteria used in Turschmid '512 are considered as aquatic microbes because they are used to treat an aqueous solution. Without a showing of criticality or unexpected results, the use of the claimed bacteria is not seen as a patentable difference because it would have been obvious to one skilled in the art to select any known type of bacteria that can decompose the VOCs to carbon dioxide and water through routine experimentation.

The differences are Turschmid '512 does not disclose (1) the use of a filter medium to support the bacteria and (2) the step of contacting the treated exhaust gas

with an active carbon to remove any remaining harmful substance in the treated exhaust gas.

For difference (1), Eguchi '620 discloses that for the biological treatment of an organic matter-containing water to remove the organic matter, active researches are under way on a biological activated carbon method which uses activated carbon as a carrier for microorganisms. This method is said to allow for the treatment of difficult-to-decompose substances and the biological treatment of higher efficiency because, with the method, the time of contact between microorganisms and substrate is longer and inhibitory factors for proliferation of the microorganisms are removed by adsorption. In the biological activated carbon method, there has been used, as the carrier, spherical or granular activated carbon, and the operation for biological treatment of water has been conducted by a fluidized bed method (up flow) or a fixed bed method (down flow). Since the fixed bed method (down flow) has an advantage of very easy maintenance of apparatus but has a serious problem in that the microorganism film formed on the carrier (activated carbon) gets thicker in a relatively short time and causes clogging, the fluidized bed method (up flow) is in general use. The fluidized bed method, however, has some drawbacks (note column 1, line 25 to column 2, line 25).

Eguchi '620 teaches that the drawbacks can be removed by using of a formed material comprising a felt-like activated carbon fiber cloth, at given cloth-to-cloth distances in a water treatment vessel to use it as a carrier on which microorganisms can grow (note column 2, lines 30-51).

FIG. 1 is a flow chart showing an embodiment of Eguchi '620. Water 4 to be treated, containing organic matter, is fed through an untreated water pipe 1 and is stored in an untreated water vessel 2.

The water 4 to be treated is fed, by a water pump 6, into the bottom 10 of a bottomed, cylindrical treatment vessel 8 having a closed top end (the top end is provided with a discharge port (not shown) for venting the air 17 used for aeration) through a first water pipe 12. The top end of the treatment vessel 8 may be open depending upon the purification degree required for the water to be treated (note column 5, lines 31-44).

In the treatment vessel 8 as shown in FIG. 1 is provided a formed material 54 of roll type as shown in FIG. 2(B) with its axial direction being made the same as the axial direction of the treating vessel 8. As a result, the formed material 54 is provided in the treatment vessel 8 with its surface arranged vertically and its cloth-to-cloth distances (as hereinafter defined) kept within a desired range. The water to be treated passes through the hollow portions 58 of the formed material 54 and the gaps 60 formed by each two adjacent rows of the formed material 54, specifically the corrugated activated carbon fiber cloth 52 and the unwoven cloth substrate 50 of next row, and ascends from the bottom 10 to the top 14 if the treatment vessel 8. At this time, the organic matter present in the water to be treated, undergoes aerobic biological decomposition by the actions of (1) the oxygen in the air supplied to the bottom of the treatment vessel 8 by an aeration means 16 (an air pump in the present embodiment) and ascending upward through the hollow portions 58 and the gaps 60 similarly to the water to be treated and (2)

microorganisms which proliferates on the surface of the activated carbon fiber cloth 52. The treated water of lower organic matter concentration, i.e. lower total organic carbon (TOC) concentration is discharged outside the treatment vessel 8 through a second water pipe 18 connected to the top 14 of the treatment vessel 8. Thus, the water to be treated is passed through the treatment vessel 8 so that its flow becomes parallel to the surface of the active carbon fiber cloth. Incidentally, the discharging of the treated water through the second pipe 18 outside the treatment vessel 8 may be conducted by overflowing, or by a pressure means when the treatment vessel 8 is a closed type and the air after aeration is vented from a discharge pipe provided with a release valve (not shown) (note column 6, lines 1-33).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a support or carrier for the microorganisms (i.e. bacteria) in the process of Turschmid '512, as suggested by Eguchi '620 because the use of a carrier would allow for the treatment of difficult-to-decompose substances and the biological treatment of higher efficiency because the time of contact between the microorganisms and substrate is longer. It would also have been obvious to one skilled in the art to use a formed material comprising a felt-like activated carbon fiber cloth as suggested by Eguchi '620 as the carrier because such carrier would overcome the drawbacks of carriers that are used in the form of a fluidized bed or fixed bed.

Eguchi '620 is also applied to teach that the water to be treated can be fed to the supported bacteria either in upward flow (Figure 1) or downward flow (Figure 7). It would have been obvious to one skilled in the art to select any flow direction for the

combined teaching of Turschmid ‘512 and Eguchi ‘620 as long as there is a sufficient contacting time between the water to be treated and the supported bacteria to promote the decomposition of the contaminants in the water to be treated.

For difference (2), Cruze ‘280 discloses a process for controlling air quality of an air stream. The process comprises contacting the air stream with a composition comprising leonardite, clay, lime, an inorganic mixture, and water (note column 3, lines 33-40). The composition is packed into a biofilter to be used as filter bed (note column 3, lines 51-52). The filter bed is then contacted with an air stream contaminated with organic chemicals, generally by mechanical means such as, for example, an air blower fan or air compressor. Microorganisms present in the clay and/or leonardite of the invention composition quickly utilize the organic chemicals as substrate for growth so that the air leaving the biofilter becomes decontaminated. Examples of suitable organic chemicals include, but are not limited to, hydrocarbons, alcohols, aldehydes, mercaptans, acids, ketones, sulfides, ethers, and mixtures thereof, as long as the chemicals are volatile and can be carried into the biofilters (note column 4, lines 4-19).

Cruze ‘280 further teaches that the off-gas, i.e. the air leaving the biofilter, can be vented to the atmosphere. Alternatively, the off-gas can be fed to secondary volatile organic compound-devices such as activated carbon beds, for backup emission control (note column 4, lines 27-30).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to pass the exhaust gas in the process of Turschmid '512 to activated carbon beds, as suggested by Cruze ‘280 for backup emission control.

Applicant's arguments filed March 7, 2008 have been fully considered but they are not persuasive.

Applicants argue that from Figure 2, arrow G is indicative of the direction of gravity and biological filter medium 21 is near to an intermediate portion of organic absorption tower 220 in the gravity direction with washing nozzles 234 and sprinkling nozzles 235, in up-flow direction, are arranged close to the downside of the biological filter medium and pipeline 238 is connected to a side surface of the tower 220 above biological filter medium 221, so that treating liquid 260 is supplied to biological filter medium 221 from the upside.

Firstly, it should be noted that sprinkling nozzles 235 are for introducing air, not for the treating liquid. Secondly, Figure 2 in combination with the disclosure in Applicants' specification may provide sufficient support when the first direction is "gravity direction" and the "opposite" second direction is against “gravity direction”, i.e. up and down directions; however, the generic "opposite first and second directions" as now require in claim 1 would include other "opposite first and second directions” beside the up and down directions, such as left to right with the opposite direction of right to left. Finally, the washing nozzles 234 are used to remove adhered dead bacteria by injecting the treating liquid to the bottom surface of the biological filter medium, but there is no disclosure that the up-flow from the washing nozzles 234 could reach the top surface of the biological filter medium and there is evidence that the downward flow of

the treating liquid 260 is carried out simultaneously with the upward flow of the treating liquid through washing nozzles 234.

Applicants argue that the features of claim 15 should be readily clear at least in view of Figure. 2 of the present application and the corresponding portions of the specification as noted above.

It is unclear what is required by the limitation “supplying the treating liquid… from opposite first and second directions to the opposite first and second surfaces” even in view of Figure 2, does this limitation require that the treating liquid is fed in both first and second directions to both the first and second surfaces, i.e. each surface would have the treating liquid in both first and second directions; or the treating liquid is fed in first direction to the first surface and in second direction to the second surface?

Applicants argue that in Eguchi ‘620, the treating liquid is supplied only to a bottom surface of the filter medium, not supplying the treating liquid to a biological medium from opposite first and second directions to opposite first and second surfaces of the biological filter medium.

In Applicants’ specification, even when the treating liquid is supplied to the biological filter medium from opposite first and second directions to the opposite first and second surfaces, there would only be one “net” flow direction, based on Figure 2, the net flow should be "downward". As disclosed in Applicants' specification, the upward flow from the washing nozzles 234, which can be considered as the “opposite direction”, is to remove dead bacteria from the biological filter medium, not to promote the decomposition of the organic contaminants in the treating liquid. Without a showing

of criticality or unexpected results, supplying the treating liquid from opposite first and second directions to the opposite first and second surfaces of the biological medium filter as required in Applicants' claim is not seen as a patentable difference because it is well known in the art to remove dead bacteria from the filter in order to maintain the pressure drop for the filter medium within a desired range.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. JP 08001179 is cited to teach that removing dead bacteria from a filter bed is known and conventional in the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner is currently on a Part time schedule schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ngoc-Yen M. Nguyen/
Primary Examiner, Art Unit 1793

nmn
June 12, 2008